

**BIOLOGICAL EVALUATION
FOR
GYPSY MOTH TREATMENT ANALYSIS
MONONGAHELA NATIONAL FOREST**

Introduction

This biological evaluation documents the review and analysis of the effects of implementing the Modified Proposed Action and alternatives of the gypsy moth treatment on endangered, threatened and sensitive (ETS) species.

Forest Service (FS) policy on threatened and endangered species is found in the FS Manual at 2670.31. Sensitive species are those plant and animal species identified by a Regional Forester for which population viability is a concern. The Regional Forester for Region 9 has developed a list of sensitive species that occur on each national forest in the region (R9 Sensitive Species (SS) list; see 2670 updated, March, 2000). FS policy on SS is found in the FS Manual at 2670.32. Part of this policy states that "if impacts cannot be avoided, analyze the significance of potential adverse effects on the population or its habitat within the project area of concern and on the species as a whole (the line officer with project approval authority makes the decision to allow or disallow impact but the decision must not result in loss of species viability or create significant trends towards listing)."

To determine which of the ETS species could be affected by the project alternatives as well as areas defoliated by the gypsy moth last year, a "Likelihood of Occurrence" (LOO) table (Appendix A) was completed. In this table, all ETS species on the R9 ETS list for the Monongahela National Forest (MNF) are listed along with their status and a brief description of habitat requirements. I compared these habitat requirements to existing habitat within the project area, and used existing information on species such as district ETS records and files, records of the Natural Heritage Section of the WV Division of Natural Resources, available research literature, various field surveys, and personal communication with various ETS specialists, to determine each species' likelihood of occurrence in this project area.

Proposed Action and Alternatives

The Monongahela sustained defoliation from gypsy moth in the early nineties. Around 1995, populations subsided due to the *Entomophaga maimaiga*, a fungus which kills the caterpillars. In 2000, the Forest had approximately 20,000 acres of defoliation (heavy or moderate) across the Forest, and there was an additional 20,000 acres on private land within the proclamation boundary. Egg mass surveys in fall of 2000 show that in many of these defoliated areas, egg mass concentrations are extremely high (up to 28,000 per acre) and will almost certainly cause severe defoliation again in 2001. In situations with egg mass numbers this high, the fungus cannot be effective in reducing the population to the point where heavy defoliation does not occur. Trees can survive one heavy defoliation, but two years in a row will cause significant

mortality. In addition, the drought of 1999 has added to the stress of the trees in the eastern defoliation areas.

Table 1 displays the acres proposed for treatment in each alternatives, along with the original proposed action. Alternative 1 (The no action alternative) would not treat any acres, and is not displayed in the table. The Modified Proposed Action was developed after the egg mass surveys were completed, and reflects a more accurate number of acres that would be heavily defoliated in 2001 if these areas are not treated. Alternative 3 includes treating the entire area of high egg masses in the Lockridge Mountain area, where Alternative 2 limits treatment slightly to mirror the acreage in the original proposal and to leave an untreated area in Lockridge. Alternative 4 suggests only treating the campground that would be the riskiest to not treat due to the likelihood of users spreading the gypsy moth accidentally. All treatment will be with two applications of Bt. Bt is specific to lepidoptera, so it will kill gypsy moth and other moths whose caterpillars eat forage within 10-14 days after it is sprayed.

The No Action alternative would, of course, mean no treatment of any defoliated areas. This would also mean that some of the defoliated areas will again be heavily defoliated in 2001, and the gypsy moth will likely continue to spread south more quickly.

Table 1: Comparison of Acres by Alternative*

Treatment Areas – General Forest Areas

Treatment Area	Original Proposed Action	Alt. 2 Modified Proposed Action	Alt. 3 Entire Lockridge Block	Alt. 4 Lake Sherwood Area Only
Lee Bell North	250	270	270	0
Lee Bell South	400	370	370	0
Michael Mtn.	60	0	0	0
Thorny Creek Mtn	600	1000	1000	0
Grindstone	1120	120	120	0
Lockridge Mtn.	6120	6120	7840	0
Brushy Mtn	1600	3040	3040	0
Lake Sherwood	1000	1200	1200	1200

Treatment Areas – Management Prescription 7.0 Areas

Seneca Rocks	40	0	0	0
Lake Sherwood	1000	1000	1000	1000

Campgrounds and Their Immediate Vicinity

Big Bend	40	0	0	0
Jess Judy	40	0	0	0
Total Acres	12,270	13,120	14,840	2,200

Analysis of Effects

Determinations made in the LOO table dictate the level of analysis needed for each ETS species. Any species determined unlikely to occur in the project area are not carried into further analysis. Effects analysis is completed for any species that occur or could possibly occur within the project area. An evaluation of direct, indirect, and cumulative effects from each alternative is made for these species. The key to determining effects is evaluating how the alternative affects the habitat the species uses and, in particular, how it affects the factor that limits the species ability to thrive (limiting factor).

Threatened and Endangered Species

There are 2 endangered species that use habitat within the defoliation areas and/or the potential treatment areas. There are several defoliation areas (most of them moderate defoliation but some heavy) within the critical zones around the Virginia big-eared bat and the Indiana bat. Some defoliation occurred near the nest site of a third species, the bald eagle. One proposed treatment area falls within 5 miles of Indiana bat caves. While it is unlikely that Virginia spiraea, shale barren rock cress, or running buffalo clover (federally listed plant species) would occur in any of the proposed treatment areas as there is not suitable habitat there, it is possible that a third species, small whorled pogonia, could be present although there are no known sites in these areas. There is no habitat in any defoliation or proposed treatment area for West Virginia Northern Flying Squirrel or Cheat Mountain Salamander.

Effects from gypsy moth treatment was analyzed for all ETS species on the Forest in the Biological Assessment for Threatened and Endangered Species on the Monongahela National Forest completed in December 2000. This analysis determined that there was no effect on any ETS species from gypsy moth treatment at the levels that had been done on the Forest in the past, roughly 300 to 15,000 acres.

Bald Eagle

In July 1995, The U.S. Fish and Wildlife Service (USFWS) downlisted the bald eagle from endangered to threatened throughout the lower 48 states. On July 6, 1999, the bald eagle was proposed to be delisted, and the USFWS is still reviewing this proposal.

Regionally, the bald eagle occurs throughout the Chesapeake Bay and up into its tributaries, such as the Potomac River. The Monongahela National Forest has one nest site within its boundaries and it is located along the South Branch of the Potomac in the Smoke Hole area. Eagles are also seen occasionally at Lake Sherwood. The limiting factor for eagles in this region is human disturbance during the nesting period.

Areas near the eagle nest site were moderately defoliated in 2000. None of the alternatives proposes spraying for gypsy moth near the nest site, but all action alternatives involve spraying in the Lake Sherwood area. Effects of continued defoliation (Alternative 1) on the eagle are minimal and consist of some limited beneficial effects of additional perch trees in the vicinity of their nest site. This project will do nothing that will increase human disturbance near the eagle nesting site.

The only direct effects of any of the action alternatives on eagles could be disturbance to eagles by the low flying spray planes in the Lake Sherwood area. The chance of this would be so low

as to be discountable, since eagles are seen only occasionally in this area. The indirect effects would be the same as those described in the previous paragraph (as no treatment is proposed near eagle nesting areas), only less significant since the eagles have never been known to nest in the Lake Sherwood area.

Cumulative effects on this species are minimal with any alternative as there are no effects on the bald eagle.

Virginia big-eared Bat

The Virginia big-eared bat (VBEB) was listed as endangered on December 31, 1979. This species dwells in caves throughout the year and is known from Karst areas in Kentucky, eastern West Virginia, western Virginia, and western North Carolina (Clark and Lee 1987). West Virginia holds its largest populations, mostly in 3 caves in Pendleton County. These 3 caves are designated as critical habitat. The limiting factor for this species is disturbance in the caves during the maternity and hibernation periods.

VBEB feed predominantly on moths (Dalton et al 1986). Stihler's (1994 and 1995) studies show that this species ranges up to 6 miles from these caves to forage in the nonhibernating season. He found VBEB foraging in habitats such as open hay fields and forested areas (Ibid). This 6 mile zone around their caves then is the homerange for the species.

Several defoliation areas on the Potomac District occur within 6 miles from 4 caves on the Forest that harbor VBEB, 3 of which (Cave Mt. Cave, Hoffman Schoolhouse, and Hellhole) are designated critical habitat in the VBEB recovery plan. None of these areas are proposed for treatment. This project will do nothing that will increase disturbance levels in the caves.

There are no direct or indirect effects of the alternatives on VBEB, as no spraying will occur within their habitat. The indirect effects of all alternatives would be a change in habitat, as continued defoliation in this area may occur and consequently tree mortality. This change would not be significant for this species as it forages in a variety of habitats.

As this project will have no effects on VBEB, there are no cumulative effects.

Indiana Bat

The Indiana bat (IB) was listed as endangered under provisions of the Endangered Species Act in March 1967. A recovery plan was developed by the U.S. Fish and Wildlife Service (USFWS) in October 1983. In October 1996, the Indiana Bat Recovery Team released its first Technical Draft of a revision of the Indiana Bat Recovery Plan, and in March 1999, the Agency Draft of the Plan was released. A final version has not been released as of yet.

West Virginia is on the eastern edge of the Indiana bat's range, and contains a very small part of the population. Winter cave surveys by the West Virginia Department of Natural Resources (WVDNR) have confirmed approximately 11,000 Indiana bats hibernating in West Virginia caves. Although numbers continue to decline throughout the range, the IB numbers in WV are increasing (WVDNR data, 1999).

The limiting factors for this species are not well understood. It was thought that human disturbance during hibernation was the biggest threat but cave gates have halted much of this

activity in the core of their range, and the species as a whole is still in decline. Therefore, we will analyze effects thoroughly to all areas where they could occur.

For this species, three habitat elements can be analyzed. The hibernacula that the bats are using is one habitat element. The second element is the area around the caves that are used for summer foraging by males and for swarming habitat for males and females as shown by Stihler's (1996) work on the Forest. Stihler's (1997) work also suggests that these bats may travel up to 3.5 miles from a cave to forage. This information led, in consultation with USFWS, to giving special consideration to a 5 mile zone around IB caves.

The third element is the general forest area outside these 5 mile zones where the bats are dispersing through and perhaps using in low numbers during the summer months.

Hibernacula and 5mile zones:

Numerous summer surveys have been done in WV and on the MNF looking for the Indiana bat. Over 3700 individual bats (of several species) have been caught over the last several years, and no lactating or pregnant female IB have been captured. The only evidence of maternity activity to come out of these surveys was the capture of a juvenile IB on the Forest in August of 1999. This bat was either born and raised in this vicinity or he could have been heading to a hibernaculum on the Forest, coming from a maternity site any distance away from the Forest. If there is any maternity activity on the Forest, it is low, as indicated by only one young male found out of numerous survey attempts.

The Indiana Bat Recovery Plan classifies hibernacula in different priority classes in regards to their importance for Indiana bats, Priority One caves being caves with recorded populations of over 30,000 bats since 1980, Priority Two caves have between 500 and 30,000 bats recorded, and Priority Three caves less than 500 bats. More than 85% of the range-wide population occupy nine Priority One hibernacula, all within Indiana, Kentucky, and Missouri. There are Priority Two caves in these states as well as Arkansas, Illinois, New York, Ohio, Tennessee, Virginia and West Virginia (USFWS 1996). The Priority Two cave in WV is Hellhole, which is not on National Forest land. There are 26 caves in WV that have had observations of Indiana bats in them, five of these are on National Forest land.

Male bats have been found to use the area around hibernacula throughout the nonhibernating period. Stihler (1996) found males around Big Springs cave in June through October. These males presumably remain near the caves during the summer while females appear to migrate elsewhere to raise their young. The males then engage in roosting and foraging behavior in these 5 mile areas during the summer. IB forage on terrestrial and aquatic insects flying at night (USFWS, 1997). They prefer foraging within the upper canopy layers of forest where the canopy cover is between 50-70%. The suitability of an area declines slightly as canopy cover increases from 70-100%, and also decreases as canopy closure decreases below 50% (Romme et al. 1995). The bats day roost in large diameter trees or snags with flaky or exfoliating bark (USFWS, 1997) Romme's model (1995) predicts that IB roosting habitat increases when canopy cover is between 60-80%, when mean tree diameter, number of good quality tree species and snags increase, and when the percent of understory cover decreases.

Females appear to show up in mid August presumably to join the males in the swarming activity (Stihler 1997) before entering the hibernaculum for the winter. This "swarming" behavior is

described as bats flying in and out of caves at night but still day roosting outside the cave. This behavior occurs in August and September (Cope and Humphrey, 1977). During this time, mating occurs and the bats build up fat reserves before they enter the caves for hibernation. Stihler's telemetry work around Big Springs cave in 1997 indicates that these bats forage within a 3.5 mile area around the cave entrances. Research in other states have showed similar results (Kiser and Elliot, 1996). Current thinking is to consider a five mile radius circle around the entrances to hibernacula as swarming habitat. Five miles is used, versus 3.5, to ensure we are adequately protecting all potential swarming habitat. Roosting and foraging (as described above) are occurring in these 5 mile zones. These 5 mile zones currently are providing ample habitat for the IB, as indicated by the continued increase in bats using these areas.

There are no direct effects to IB of any of the alternatives in these habitat areas.

Indirect effects in 5 mile zones would be related to the one spray block (Lee Bell North, 269 acres), in Alternatives 2 and 3, that falls within the 5 mile zone of a Gooseberry cave, which harbored 15 IB at last count (1997). Effects of the spraying this one area of the 5 mile zone would be minimal and discountable. There would be short term effects of prey decline, but such a small area treated within a large foraging area is discountable. Indirect effect of Alternative 1 would be somewhat beneficial because continued defoliation would likely result in tree mortality, providing good sources of roost trees for the bats. However, if defoliation continues to be very heavy, some long term decrease of canopy cover would be expected, and therefore, less available prey, which would be detrimental to the species.

General Forest Area:

Surveys have not shown any maternity use on the Forest, or in West Virginia. Data indicates that the use of the general forest area on the Forest by IB is incidental. Bats that are using the general forest area are looking for the same foraging and roosting habitat that is described in the 5 mile zone discussion above. These conditions are available throughout much of the Forest, including the areas proposed for treatment.

Female Indiana bats arrive in their summer habitat as early as April 15, cluster together forming maternity colonies, and give birth to offspring in June or July (USFWS 1997). This species uses trees or snags with exfoliating bark, or sometimes tree cavities, for maternity and summer day roosts (Garner and Gardner, 1992; Kurta et al, 1996; USFWS, 1997) and they will use different roosts based on weather, switching between shaded and unshaded trees depending on conditions and physiological requirements (Callahan et al, 1997; Kurta et al, 1996). The maternity sites are very important as the young are quite vulnerable until they are volant.

There are no direct effects of continued defoliation (Alternative 1) on IB. The indirect effects of defoliation in the general forest area are as described in the 5 mile zone section except less so, since we know that the distribution of IB in these general forest areas on the Forest is very low. Additionally, dying trees are the best potential roost trees. Obviously, too much tree mortality would be detrimental as IB like forested conditions, but since most of the forest is not defoliated, overall the effect would be positive.

There would be no direct effect of spraying Bt (Action alternatives) on the IB since this insecticide does not affect mammals. The indirect effect of spraying would be that other moth caterpillars would die and leave less prey base for the IB in the short term, if any are using these areas. This effect would be the least in Alternative 4, and the most in Alternative 3. Even in

Alternative 3, however, the acreage that will be sprayed is small, relative to the acres available on the Forest, and this is a discountable effect. In the early 1990's, between 7,600 and 15,200 acres were treated on the Forest and we still see an increase in IB numbers in the state. All the proposed alternatives in this project are below or within this range of historic spraying.

There will be additional spraying on private lands in areas that was defoliation. Most likely these private landowners will use Dimilin which will have a more detrimental effect on insect prey than the Bt. The GW/Jeff National Forest is also proposing spraying for gypsy moth (both Bt and Dimilin are proposed) so that too will have effects on prey base for the short term. The effect of all this together is still discountable, considering the low numbers of IB in these general forest areas.

Small Whorled Pogonia

There is potential habitat in the proposed treatment and defoliated areas for this species. The limiting factor is loss or disturbance of populations or habitat. Alternative 1 will have no direct effects on the plants, and indirect effects would be possible herbivory by the moth if caterpillar numbers are high enough, and increased light from gaps in the overstory from tree mortality. There is some evidence that this species prefers some canopy gaps, if not too numerous, so these may be beneficial.

As spraying is not directly ground disturbing, and the Bt will not harm any plants that occur in treatment areas, and there is no direct effect on this species from any action alternative. Spraying would reduce the amount of future defoliation and perhaps preclude some enhancement of pogonia habitat but the effect of this would be negligible.

This project would have no cumulative effects on this species, as the project does not affect any known populations or individuals.

Sensitive Species

Several sensitive species occur or could occur in defoliated areas, and areas that are proposed for spraying. These species will be grouped according to how they may be affected by Bt application and defoliation.

Insect Eaters

Animals that eat insects may be affected by spraying insecticides as this may decrease their available food sources. The only insect-eating sensitive species that could possibly occur in defoliated or treatment areas is the eastern small-footed bat. This species occurs near defoliated areas and some of the proposed treatment areas, and has suitable habitat within these areas. The limiting factor for this species is the loss of disturbance of habitat. The majority of habitat for this species is in the North Fork Mountain area of the Potomac District, some of which sustained defoliation in 2000 but is not proposed for treatment. There is also an occurrence near the large area of defoliation (and proposed treatment in Alternatives 2, 3 and 4) in the Lockridge area. It

is not likely that this species eats moths as large as the gypsy moth, but it does eat some smaller moth species, as well as other flying insect, such as flies and mosquitoes. There would be no direct effect to this species by continued defoliation, or Alternative 1. Indirectly, however, as the species prefers a forested environment, the amount of possible defoliation (around 40,000 acres or more within the proclamation area) and consequent tree mortality could be detrimental.

There would be no direct effect of any of the action alternatives as this compound does not affect mammals, but indirectly this would reduce the available prey for this species. None of the alternatives propose spraying in areas where there are known small-footed bat occurrences, or the most favorable small-footed bat habitat, so the effects would be minimal.

Hard Mast Consumers

Species that consume hard mast are at risk from defoliation and mortality of oak trees caused by the gypsy moth. The Allegheny woodrat relies heavily on acorns and other hard mast, and occurs in several of the defoliated areas. The limiting factor for this species is the availability of hard mast food source. There is no direct effect on this species by any of the action alternatives, as spraying does not affect mammals, or by the no action of continued defoliation. The indirect effects of continued defoliation may be detrimental, as even if mortality of mast trees is not high, the continued defoliation will severely lessen mast production. Woodrats only travel approximately 300 feet from their nest sites to gather food, so a decrease in food sources in that home range could result in stress and starvation.

The defoliated areas that are known to have the woodrats in them are not proposed for treatment. This is because none of these areas were heavily defoliated in 2000 and most had no previous defoliation that would stress the trees. Egg mass surveys were not done in moderate defoliation areas, so we don't know how extensive future defoliation will be. We will monitor these areas next spring to see how extensive defoliation is, and if they sustain heavy defoliation next year, they will be considered for treatment in 2002.

Aquatic Species

With any kind of aerial pesticide spray, there is always concern for aquatic systems. There are 3 aquatic species that could occur near, or downstream from proposed treatment areas, the candy darter, pearl dace, and New River shiner. There would be no direct effects of continued defoliation (Alternative 1) but the indirect effects could be less canopy cover over streams if there is a lot of tree mortality, which could mean warmer stream temperatures. There would be no direct effects of spraying since the insecticide does not affect aquatic organisms (USDA-1995 pg. 5-19,20). The indirect effects of spraying would be beneficial as it would preclude additional tree mortality.

Insects

The insecticide Bt can have effects on any Lepidoptera that feeds on leaves during the time it is sprayed. There is one sensitive insect that could be affected by the proposed action. The diana fritillary could occur in the defoliated areas on the southern end of the Forest as there is suitable habitat there, although it has rarely been found this far north so it is very unlikely that it would be affected by the spraying (Allen, pers comm. 2000). There would be no direct effect to this species from Alternative 1, but the indirect effect of continued defoliation may be of long term detriment. The diana's host plant is the violet which prefers some level of forested conditions so defoliation would not be beneficial. Also, the gypsy moth may feed on understory plants such as the violet in these areas where the populations will be very high. Because the diana is not often found as far north as the proposed spray areas in any of the action alternatives, it is unlikely that there would be any direct effects on the species. Indirectly the spraying may preclude defoliation and possible reduction in their host plant availability.

The grizzled skipper, a species of state concern, also occurs south of the areas considered for spraying. This species was severely affected in some areas by Dimilin spraying several years ago (Allen pers comm. 2000), and could be affected by spraying any further south than we are proposing.

Plants

The plants are grouped because the gypsy moth, in high enough numbers, may eat understory plants when the tree leaves have been eaten. There are several sensitive plant species that could be affected. A few of these plants (lillydale onion, butternut, smokehole bergamot, and Virginia nailwort) are present in areas that were defoliated in 2000. Near the defoliated areas are Cooper's milkvetch, tall larkspur. Species that could possibly occur in defoliated or proposed treatment area because there is suitable habitat there would be white alumroot, crested coralroot, highland rush, Canby's mountain lover, rock skullcup, robust fire pink, Kate's mountain clover, nodding pogonia, Appalachian blue violet, sand grape.

All of these plants could be directly affected by continued defoliation (Alternative 1) since they may get eaten, and will lose some forest overstory. There is no spraying in any proposal near any of the above mentioned known plant locations. Alternative 3 would affect the largest amount of potential habitat for these plant species, and Alternative 4 the least. There would be no direct effect from spraying Bt on these plants (USDA-1995, pg. 5-19). Indirectly the spraying would be a benefit unless the plant would benefit from additional light and less canopy. We do not know this to be the case for any of the plants mentioned here, as all of these occur primarily in closed canopy forests.

Predators

Predatory animals may be affected by gypsy moth and insecticide spraying mostly by effects to the habitat they occupy. The rattlesnake and peregrine falcon both have potential habitat within defoliated areas. The limiting factor for the rattlesnake is collecting and killing by humans, as well as habitat destruction. There would be no direct effect of Alternative 1 on this animal, but indirect effects would be opening up the canopy. In den areas this would be beneficial. Reduction in mast, leading to perhaps a decline in rodent populations may have some effect on the snake. There are no known rattlesnake dens in defoliation or treatment areas but potential habitat is there. There would be no direct effects from spraying Bt, but indirect effects would be that more mast would be available for rodents long term so prey would be more readily available than if mast trees die. None of the limiting factors for this species will be affected by any of the alternatives.

The peregrine falcon occurs within one of the defoliation areas. The limiting factor for this species is disturbance during its nesting period. This project will not affect this limiting factor. None of the defoliated areas near the peregrine nesting sites will be treated in any of the alternatives, so some of these areas will most likely sustain additional defoliation next year. Peregrines nest on cliff areas that don't have forested cover anyway, so their habitat may not be much affected by defoliation.

Summary of Cumulative Effects

Other actions related to this project are private landowners in the vicinity of the Forest, and within the proclamation boundary, that will be spraying for the gypsy moth, and most of these will use Dimilin. Also, the neighboring George Washington/Jefferson National Forest has proposed spraying Dimilin and Bt on several areas in Virginia. Cumulatively, these actions combined with the proposal here will result in beneficial effects for the hard mast consumers, aquatic species, and plants, and a somewhat negative effect for the insect eaters and insects themselves. Cumulative effects on the predators are minimal if any.

Summary of Determinations

In summary, based on the above effects analysis for the above species, it is my professional opinion that implementing the any of the Alternatives of the Gypsy Moth Analysis will not be likely to adversely affect the Indiana bat and will have no effect on any other endangered or threatened species. Neither will there be any loss of population viability over the Forest for any of the sensitive species, nor a trend towards federal listing resulting from implementing these actions.

If any federally-listed endangered or threatened species are found during project design or implementation, consultation with the USDI Fish and Wildlife Service will be initiated.

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